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By putting a confined inter source, we construct a model which can give us convergent solution from free field equation. On the other hand, the solution of new field equation can be separated into two parts, one part is just same as the one in Quantum Field Theory and make it survived in this model, and the other part, which we will see doesn't take energy and momentum, just gives us a negative propagator which can soften quadratic divergence.

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I. INTRODUCTION

It is impossible for us to find convergent stationary solution from free Schrödinger equation or free field equation. But if we put an inter source which moves together with the outside field, we can get solution converged as $\sim \frac{1}{r}e^{-mr}$ from this new free field equation. This inter source is confined in very small region and particle-like. The solution is not unique, and we can separate the solution into tow parts. The first part satisfies usual field equation and has the usual form $\sim e^{ip^\mu x_\mu}$. Because of this, although we changed field equation and Lagrangian, the Quantum Field Theory survived in this model. But very different from the first part of solution, the second part looks like $\sim \frac{1}{r}e^{-mr}$. We can see this part is totally momentum and energy free, and also, we cannot increase or decrease its' momentum and energy. This is why we haven't found it before. The second part of field same to be hidden behind the first part, like "Hidden Variables". [1]

Since we changed field equation, we have to rewrite the field Lagrangian to give the new field equation, and the second part of field along with the inter source can contribute a negative propagator which can cancel the quadratic divergence.

In Sec. 2, we rewrite free field equation, and get convergent solutions. We also calculate the total electromagnetic energy of a charge in this model and we will see it is finite. In Sec. 3, we write down the Lagrangian which can give us the new field equation. In Sec. 4, we will see that the second part of field contribute nothing but a negative propagator when we calculate cross-section. In Sec.5, we discuss new description of wave-particle duality in this model different from the statistical description. [2]

II. CONVERGENT SOLUTION OF FREE FIELD EQUATION WITH INTER SOURCE

By adding an inter source to free field equation, we get new field equation and we will see the solution of the equation is converged to the source and electromagnetic energy of a charge is finite.

The usual free field equation of Dirac, Scalar and Maxwell particles are:

$$(\gamma^\mu \frac{1}{i}\partial_\mu + m)\psi(x) = 0 \tag{1}$$

$$(-\Box + \mu^2)\phi(x) = 0 \tag{2}$$

$$-\Box A_\mu(x) = 0 \tag{3}$$

the solutions of this equations are

$$\psi(x) = \sum_{\alpha,p}\sqrt{\frac{m}{E_p V}}(a_p \mu_{p\alpha} e^{ip^\mu x_\mu} + b_p^+ \mu_{p\alpha}^c e^{-ip^\mu x_\mu}) \tag{4}$$

$$\phi(x) = \sum_p \sqrt{\frac{1}{2\omega_p V}}(a_p e^{ip^\mu x_\mu} + a_p^+ e^{-ip^\mu x_\mu}) \tag{5}$$

$$A_\mu(x) = \sum_{\lambda,k} \frac{\vec{e}_k^\lambda}{\sqrt{2\omega_k V}}(a_k^\lambda e^{ikx} + a_k^{\lambda+} e^{-ikx}) \tag{6}$$

Now we put an inter source and equations become

$$(\gamma^\mu \frac{1}{i}\partial_\mu + m_2)\psi(x) = -f_1(x) \tag{7}$$

$$(-\Box + \mu_2^2)\phi(x) = -f_2(x) \tag{8}$$

$$(-\Box + \bar{\mu}_2^2)A_\mu(x) = -f_{3\mu}(x) \tag{9}$$

where m_2, μ_2^2 are not necessarily equal to m, μ^2, and $\bar{\mu}_2^2$ is not necessarily equal to 0.
To separate the solutions into two parts, we rewrite the equations (8),(9) (10) as

$$(\gamma^\mu \frac{1}{i}\partial_\mu + m)\psi_1(x) - (\gamma^\mu \frac{1}{i}\partial_\mu + m_2)\psi_2(x) = f_1(x) \tag{10}$$

$$(-\Box + \mu^2)\phi_1(x) - (-\Box + \mu_2^2)\phi_2(x) = f_2(x) \tag{11}$$

$$(-\Box)A_{1\mu}(x) - (-\Box + \bar{\mu}_2^2)A_{2\mu}(x) = f_{3\mu}(x) \tag{12}$$

where $\psi_1(x)$, $\phi_1(x)$, $A_{1\mu}(x)$ obey the equation (1), (2), (3), and same as (4), (5), (6). We write first part and second part with different sign because we hope to get a negative propagator.

We don't know the exactly structure of source, like a string or brane? We assume it is confined in very small region, and to such kind of source, $\psi_2(x)$, $\phi_2(x)$, $A_{2\mu}(x)$ have solutions:

$$\psi_2(x) = a_1\tilde{\mu}(\theta)\frac{1}{r}e^{-m_2 r} \tag{13}$$

$$\phi_2(x) = a_2\frac{1}{r}e^{-\mu_2 r} \tag{14}$$

$$A_{2\mu}(x) = a_3\frac{1}{r}e^{-\bar{\mu}_2 r} \tag{15}$$

where r should be greater than the dimensions of inter source.
We can see $\psi_2(x)$, $\phi_2(x)$, $A_{2\mu}(x)$ don't take energy or momentum. $\psi_2(x)$, $\phi_2(x)$, and $A_{2\mu}(x)$ act as "manifold" of $\psi_1(x)$, $\phi_1(x)$, $A_{1\mu}(x)$. So on the edge of $\psi_2(x)$, $\phi_2(x)$, and $A_{2\mu}(x)$, where $\psi_2(x)$, $\phi_2(x)$, and $A_{2\mu}(x)$ approach to zero, $\psi_1(x)$, $\phi_1(x)$, and $A_{1\mu}(x)$ should also disappear. Let's define at r$\geq\Lambda_1$, Λ_2, Λ_3, $\psi_1(x)$, $\phi_1(x)$, $A_{1\mu}(x)$ equal to zero.
We write (10), (11), (12) as another way

$$\sum_{\tilde{a}=1,2}(\gamma^\mu \frac{1}{i}\partial_\mu + m_{\tilde{a}})\psi_{\tilde{a}}(x) - 2(\gamma^\mu \frac{1}{i}\partial_\mu + m_2)\psi_2(x) = f_1(x) \tag{16}$$

$$\sum_{\tilde{a}=1,2}(-\Box + \mu_{\tilde{a}}^2)\phi_{\tilde{a}}(x) - 2(-\Box + \mu_2^2)\phi_2(x) = f_2(x) \tag{17}$$

$$\sum_{\tilde{a}=1,2}(-\Box + \bar{\mu}_{\tilde{a}}^2)A_{\tilde{a}\mu}(x) - 2(-\Box + \bar{\mu}_2^2)A_{2\mu}(x) = f_{3\mu}(x) \tag{18}$$

where $m_1 = m$, $\mu_1^2 = \mu^2$, $\bar{\mu}_1^2 = 0$
From (4) and at r$\geq$ Λ_1, $\psi_1(x) = 0$, the electric field of a free charge e is

$$\vec{E} = \frac{e\vec{r}}{4\pi\varepsilon r^3} \qquad r \geq \Lambda_1$$

and

$$\vec{E} = \frac{e\vec{r}}{4\pi\varepsilon\Lambda_1^3} \qquad r < \Lambda_1 \tag{19}$$

It's consistent with Coulomb's Law $\vec{E} = \frac{e\vec{r}}{4\pi\varepsilon r^3}$ at r$\geq \Lambda_1$, and $\vec{E} = 0$ at r=0.
The total Electromagnetic energy of a free charge e is

$$E = \frac{e^2}{30\pi^2\varepsilon^2}\frac{1}{\Lambda_1} \tag{20}$$

III. LAGRANGIAN

In this part we write down the Lagrangian which can give equation (16), (17), (18).
To free Scalar, Dirac and Maxwell fields, the Lagrangian becomes

$$\begin{aligned}
L_0 = &-\bar{\psi}_{\tilde{a}}(x)(\gamma^\mu \frac{1}{i}\partial_\mu + m_{\tilde{a}})\psi_{\tilde{a}}(x) + 2\bar{\psi}_2(x)(\gamma^\mu \frac{1}{i}\partial_\mu + m_2)\psi_2(x) \\
&+\bar{f}_1(x)\psi_2(x) + \bar{\psi}_2(x)f_1(x) \\
&-\frac{1}{2}[\partial_\mu\phi_{\tilde{a}}(x)\partial^\mu\phi_{\tilde{a}}(x) + \mu_{\tilde{a}}^2\phi_{\tilde{a}}(x)\phi_{\tilde{a}}(x)] + [\partial_\mu\phi_2(x)\partial^\mu\phi_2(x) + \mu_2^2\phi_2^2(x)] \\
&+f_2(x)\phi_2(x) \\
&-\frac{1}{4}F_{\tilde{a}}^{\mu\nu}(x)F_{\tilde{a}\mu\nu}(x) \\
&+\frac{1}{2}F_2^{\mu\nu}F_{2\mu\nu} + \bar{\mu}_2^2 A_{2\mu}(x)A_2^\mu(x) \\
&+f_{3\mu}(x)A_2^\mu(x)
\end{aligned} \tag{21}$$

where

$$\begin{aligned}
F_{1\mu\nu} &= \partial_\mu A_{1\nu} - \partial_\nu A_{1\mu} \\
F_{2\mu\nu} &= \partial_\mu A_{2\nu} - \partial_\nu A_{2\mu}
\end{aligned} \tag{22}$$

Approximately, we write $f_1(x) \sim c_1\psi_2(x)$,$f_2(x) \sim c_2\phi_2(x)$, $f_{3\mu}(x) \sim c_3 A_{2\mu}(x)$, then (21) can be written as

$$\begin{aligned}
L_0 = &-\bar{\psi}_{\tilde{a}}(x)(\gamma^\mu \frac{1}{i}\partial_\mu + m_{\tilde{a}})\psi_{\tilde{a}}(x) + 2\bar{\psi}_2(x)(\gamma^\mu \frac{1}{i}\partial_\mu + m_2)\psi_2(x) \\
&-\frac{1}{2}[\partial_\mu\phi_{\tilde{a}}(x)\partial^\mu\phi_{\tilde{a}}(x) + \mu_{\tilde{a}}^2\phi_{\tilde{a}}(x)\phi_{\tilde{a}}(x)] + [\partial_\mu\phi_2(x)\partial^\mu\phi_2(x) + \mu_2^2\phi_2^2(x)] \\
&-\frac{1}{4}F_{\tilde{a}}^{\mu\nu}(x)F_{\tilde{a}\mu\nu}(x) \\
&+\frac{1}{2}F_2^{\mu\nu}F_{2\mu\nu} + \bar{\mu}_2^2 A_{2\mu}(x)A_2^\mu(x)
\end{aligned} \tag{23}$$

here we replace $m_2 \to m_2 - 2c_1, \mu_2^2 \to \mu_2^2 - 2c_2, \bar{\mu}_2^2 \to \bar{\mu}_2^2 - c_3$.

And the interaction term of Dirac and Maxwell fields becomes

$$L_I = \bar{\psi}_{\tilde{a}}\partial^\mu\psi_{\tilde{a}}A_{\tilde{a}\mu} \tag{24}$$

The usual $U(1) \times SU(2)_L$ gauge invariant Lagrangian density for Leptons [3] is

$$L = L_1 + L_2 + L_3 \tag{25}$$

where

$$L_1 = -\frac{1}{4}W^a_{\mu\nu}W^{a\mu\nu} - \frac{1}{4}F_{\mu\nu}F^{\mu\nu} \tag{26}$$

$$L_2 = -\bar{R}\frac{1}{i}\gamma^\mu D_\mu R - \bar{L}\frac{1}{i}\gamma^\mu D_\mu L \tag{27}$$

$$\begin{aligned} L_3 = &-D_\mu\phi^+ D^\mu\phi - m^2\phi^+\phi - \lambda(\phi^+\phi)^2 \\ &-Ge(\bar{L}\phi R + \bar{R}\phi^+ L) \end{aligned} \tag{28}$$

where

$$W^a_{\mu\nu} = \partial_\mu W^a_\nu - \partial_\nu W^a_\mu + gf^{abc}W^b_\mu W^c_\nu \tag{29}$$

$$F_{\mu\nu} = \partial_\mu B_\nu - \partial_\nu B_\mu \tag{30}$$

$$D_\mu R = (\partial_\mu + ig' B_\mu)R \tag{31}$$

$$D_\mu L = [\partial_\mu + \frac{i}{2}g' B_\mu - \frac{i}{2}g\sigma_i W^i_\mu]L \tag{32}$$

$$D_\mu \phi = [\partial_\mu - \frac{i}{2}g\sigma_i W^i_\mu - \frac{i}{2}g' B_\mu]\phi \tag{33}$$

Now considering the dynamics of source, the total Lagrangian density for Leptons becomes

$$L = \tilde{L}_1 + \tilde{L}_2 + \tilde{L}_3 \tag{34}$$

where

$$\begin{aligned} \tilde{L}_1 = &-\frac{1}{4}W^a_{\tilde{a}\mu\nu}W^{a\mu\nu}_{\tilde{a}} - \frac{1}{4}F_{\tilde{a}\mu\nu}F^{\mu\nu}_{\tilde{a}} \\ &+\frac{1}{2}(\partial_\mu W^a_{2\nu} - \partial_\nu W^a_{2\mu})(\partial^\mu W^{a\nu}_2 - \partial^\nu W^{a\mu}_2) \\ &+\frac{1}{2}(\partial_\mu B_{2\nu} - \partial_\nu B_{2\mu})(\partial^\mu B^\nu_2 - \partial^\nu B^\mu_2) \\ &+M_{2wab}W^a_{2\mu}W^{b\mu}_2 + M_{2B}B_{2\mu}B^\mu_2 \end{aligned} \tag{35}$$

$$\begin{aligned} \tilde{L}_2 = &-\bar{R}_{\tilde{a}}\frac{1}{i}\gamma^\mu D_{\tilde{a}\mu}R_{\tilde{a}} - \bar{L}_{\tilde{a}}\frac{1}{i}\gamma^\mu D_{\tilde{a}\mu}L_{\tilde{a}} \\ &+2\bar{R}_2\frac{1}{i}\gamma^\mu\partial_\mu R_2 + 2\bar{L}_2\frac{1}{i}\gamma^\mu\partial_\mu L_2 \\ &+m_{2e}(e^+_{2L}e_{2R} + e^+_{2R}e_{2L}) \\ &+P(\nu_2) \end{aligned} \tag{36}$$

$$\begin{aligned} \tilde{L}_3 = &-D_{1\mu}\phi^+_1 D^\mu_1\phi_1 - m^2_1\phi^+_1\phi_1 - \lambda(\phi^+_{\tilde{a}}\phi_{\tilde{a}})^2 \\ &-Ge(\bar{L}_1\phi_1 R_1 + \bar{R}_1\phi^+_1 L_1) \\ &+\partial_\mu\phi^+_2\partial^\mu\phi_2 + m^2_2\phi^+_2\phi_2 \end{aligned} \tag{37}$$

where

$$W^a_{1\mu\nu} = \partial_\mu W^a_{1\nu} - \partial_\nu W^a_{1\mu} + gf^{abc}W^b_{1\mu}W^c_{1\nu} \tag{38}$$

$$W^a_{2\mu\nu} = \partial_\mu W^a_{2\nu} - \partial_\nu W^a_{2\mu} + gf^{abc}W^b_{2\mu}W^c_{2\nu} \tag{39}$$

$$F_{1\mu\nu} = \partial_\mu B_{1\nu} - \partial_\nu B_{1\mu} \tag{40}$$

$$F_{2\mu\nu} = \partial_\mu B_{2\nu} - \partial_\nu B_{2\mu} \tag{41}$$

$$D_{1\mu}R_1 = (\partial_\mu + ig' B_{1\mu})R_1 \tag{42}$$

$$D_{2\mu}R_2 = (\partial_\mu + ig' B_{2\mu})R_2 \tag{43}$$

$$D_{1\mu}L_1 = [\partial_\mu + \frac{i}{2}g' B_{1\mu} - \frac{i}{2}g\sigma_i W^i_{1\mu}]L_1 \tag{44}$$

$$D_{2\mu}L_2 = [\partial_\mu + \frac{i}{2}g' B_{2\mu} - \frac{i}{2}g\sigma_i W^i_{2\mu}]L_2 \tag{45}$$

$$D_{1\mu}\phi_1 = [\partial_\mu - \frac{i}{2}g\sigma_i W^i_{1\mu} - \frac{i}{2}g' B_{1\mu}]\phi_1 \tag{46}$$

where under U(1) and $SU(2)_L$ transformation, $W_2\mu, B_{2\mu}, R_2, L_2, \phi_2$ are invariants.

$P(\nu_2)$ is the term to give ν_2 mass. One of possibilities is

$$P(\nu_2) = m_{2\nu}(\bar{\nu}_{2L}\nu_{2R} + \bar{\nu}_{2R}\nu_{2L}) \tag{47}$$

that means, although possibly ν_{1R} doesn't exist, ν_{2R} does.

To quarks, the usual Lagrangian density is [3]

$$L = -\frac{1}{4}F^a_{\mu\nu}F^{a\mu\nu} - \sum_{i=1}^{6}\bar{\psi}_i(\frac{1}{i}\gamma^\mu D_\mu + m_i)\psi_i \tag{48}$$

now including the inter source, the Lagrangian becomes

$$\begin{aligned} L = &-\frac{1}{4}F^a_{\tilde{a}\mu\nu}F^{a\mu\nu}_{\tilde{a}} - \sum_{i=1}^{6}\bar{\psi}_{\tilde{a}i}(\frac{1}{i}\gamma^\mu D_{\tilde{a}\mu} + m_{\tilde{a}i})\psi_{\tilde{a}i} \\ &+\frac{1}{2}(\partial_\mu A^a_{2\nu} - \partial_\nu A^a_{2\mu})(\partial^\mu A^{a\nu}_2 - \partial^\nu A^{a\mu}_2) \\ &+\bar{m}^2_2 A^a_{2\mu}A^{a\mu}_2 \\ &+2\sum_{i=1}^{6}\bar{\psi}_{2i}(\frac{1}{i}\gamma^\mu\partial_\mu + m_{2i})\psi_{2i} \end{aligned} \tag{49}$$

IV. S-MATRIX

In Section 2, we separate Scalar,Dirac, Maxwell field into two parts (4),(5),(6) and (13),(14),(15). The first part, (4),(5), (6), like $\sim e^{ip^\mu x_\mu}$, is same as usual free quantum field. And the second part, (13),(14),(15), like $\sim \frac{1}{r}e^{-mr}$, doesn't take energy and momentum. Because of this property, the second part will contribute nothing but an negative propagator when we calculate cross-section.

Because of Inter-source, the S-Matrix can be written as

$$\begin{aligned} S &= <\psi_{\tilde{a}1}(x_1)\cdots\bar{\psi}_{\tilde{a}1}(y_1)\cdots\phi_{\tilde{a}1}(z_1)\cdots|\psi'_{\tilde{a}1}(x'_1)\cdots\bar{\psi}'_{\tilde{a}1}(y'_1)\cdots\phi'_{\tilde{a}1}(z'_1)\cdots> \\ &= \int dx_1\cdots dx'_1\cdots dy_1\cdots dy'_1\cdots dz_1\cdots dz'_1\cdots <\psi_{\tilde{a}1}(x_1)\cdots\bar{\psi}_{\tilde{a}1}(y_1)\cdots\phi_{\tilde{a}1}(z_1)\cdots| \\ &\quad \psi_{\tilde{a}1}(x_1)\cdots\bar{\psi}_{\tilde{a}1}(y_1)\cdots\phi_{\tilde{a}1}(z_1)\cdots R\psi'_{\tilde{a}1}(x'_1)\cdots\bar{\psi}'_{\tilde{a}1}(y'_1)\cdots\phi'_{\tilde{a}1}(z'_1)\cdots \\ &\quad |\psi'_{\tilde{a}1}(x'_1)\cdots\bar{\psi}'_{\tilde{a}1}(y'_1)\cdots\phi'_{\tilde{a}1}(z'_1)\cdots> \end{aligned} \tag{50}$$

But because of the Inter-source, $|\psi_2>, |\phi_2>, |A_{2\mu}>$ cannot take energy or momentum, and also we cannot increase or decrease their energy or momentum, so we can write

$$\begin{aligned} \psi_{\tilde{a}}|\psi_{\tilde{a}}> &= \psi_1|\psi_1> + \psi_2|\psi_2> \\ &= \psi_1|\psi_1> \end{aligned} \tag{51}$$

$$\begin{aligned} \phi_{\tilde{a}}|\phi_{\tilde{a}}> &= \phi_1|\phi_1> + \phi_2|\phi_2> \\ &= \phi_1|\phi_1> \end{aligned} \tag{52}$$

$$\begin{aligned} A_{\tilde{a}\mu}|A_{\tilde{a}\mu}> &= A_{1\mu}|A_{1\mu}> + A_{2\mu}|A_{2\mu}> \\ &= A_{1\mu}|A_{1\mu}> \end{aligned} \tag{53}$$

then S-Matrix becomes

$$\begin{aligned} S = &\int dx_1\cdots dx'_1\cdots dy_1\cdots dy'_1\cdots dz_1\cdots dz'_1\cdots <\psi_{11}(x_1)\cdots\bar{\psi}_{11}(y_1)\cdots\phi_{11}(z_1)\cdots|\psi_{11}(x_1)\cdots\psi_{11}(y_1)\cdots\phi_{11}(z_1)\cdots \\ &R\psi'_{11}(x'_1)\cdots\bar{\psi}_{11}\prime(y'_1)\cdots\phi'_{11}(z'_1)\cdots|\psi'_{11}(x'_1)\cdots\psi'_{11}(y'_1)\cdots\phi'_{11}(z'_1)\cdots> \end{aligned} \tag{54}$$

But $\psi_2, \phi_2, A_{2\mu}$ can contribute an negative propagator to S-Matrix.

$$\begin{aligned} S(x,y) &= i < 0|T(\bar{\psi}_{\tilde{a}}(x)\psi_{\tilde{a}}(y))|0> \\ &= i < 0|T(\bar{\psi}_1(x)\psi_1(y))|0> + i < 0|T(\bar{\psi}_2(x)\psi_2(y))|0> \end{aligned} \tag{55}$$

$$\begin{aligned} \Delta(x,y) &= i < 0|T(\phi_{\tilde{a}}(x)\phi_{\tilde{a}}(y))|0> \\ &= i < 0|T(\phi_1(x)\phi_1(y))|0> + i < 0|T(\phi_2(x)\phi_2(y))|0> \end{aligned} \tag{56}$$

$$\begin{aligned} D_{\mu\nu}(x,y) &= i < 0|T(A_{\tilde{a}\mu}(x)A_{\tilde{a}\nu}(y))|0> \\ &= i < 0|T(A_{1\mu}(x)A_{1\nu}(y))|0> + i < 0|T(A_{2\mu}(x)A_{2\nu}(y))|0> \end{aligned} \tag{57}$$

From the Lagrangian(23), to first order, we can get

$$S^0(p) = \frac{1}{\gamma p + m} - \frac{1}{\gamma p + m_2} \tag{58}$$

$$\Delta^0(p) = \frac{1}{p^2 + \mu^2} - \frac{1}{p^2 + \mu_2^2} \tag{59}$$

$$D^0_{\mu\nu}(k) = \frac{\eta_{\mu\nu}}{k^2} - \frac{\eta_{\mu\nu}}{k^2 + \bar{\mu}_2^2} \tag{60}$$

where $m_2, \mu_2^2, \bar{\mu}_2^2$ should be very big.

When we calculate tree graph, because $m_2, \mu_2^2, \bar{\mu}_2^2$ are very big, the second term of (58),(59),(60) are very small, but when we calculate loop graph, they can cancel quadratic divergence.

In the same way we can write the propagator of gauge field

$$\begin{aligned} D^{\alpha\beta}_{\mu\nu}(x,y) &= i < 0|T(A^{\alpha}_{\tilde{a}\mu}(x)A^{\beta}_{\tilde{a}\nu}(y))|0> \\ &= i < 0|T(A^{\alpha}_{1\mu}(x)A^{\beta}_{1\nu}(y))|0> + i < 0|T(A^{\alpha}_{2\mu}(x)A^{\beta}_{2\nu}(y))|0> \end{aligned} \tag{61}$$

From Lagrangian (49), to first order and Feynman gauge, the propagator becomes

$$D^{0\alpha\beta}_{\mu\nu}(k) = \frac{\eta_{\mu\nu}}{k^2}\delta^{\alpha\beta} - \frac{\eta_{\mu\nu}}{k^2 + \bar{m}^2}\delta^{\alpha\beta} \tag{62}$$

where $\bar{m}^2$ should also be very big.

V. WAVE-PARTICLE DUALITY

We assume every real particle has an inter source. Because the source is confined in a very small region, as assumed, particle has an inter core which make it particle-like. On the other hand, the quantum field, outside its inter source, can move like wave and make it wavelike. So, here, we give a new description of wave-particle duality.

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